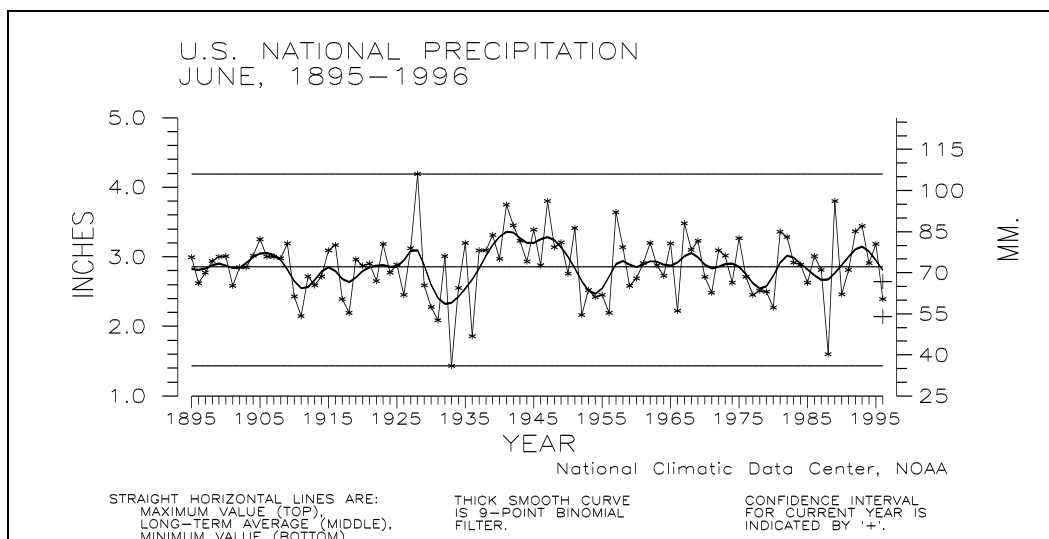
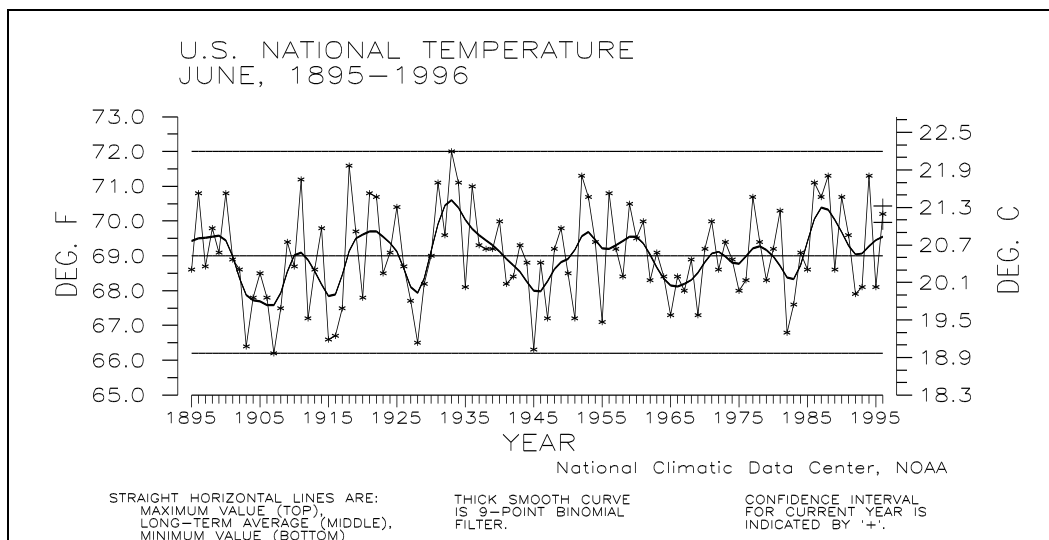


# CLIMATE VARIATIONS BULLETIN



This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Prediction Center (formerly, Climate Analysis Center), and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. **THE CURRENT DATA SHOULD BE USED WITH CAUTION.** These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

The narrative, tables, and graphs in the CVB are also available via automated facsimile. The previous month's summary can be obtained after the tenth of the month by dialing 704-271-4570 and selecting the appropriate menu codes. A touch-tone fax machine is required.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server

URL for the CVB: <http://www.ncdc.noaa.gov/publications/cvb/cvb.html>

NCDC's anonymous FTP server

Machine: <ftp.ncdc.noaa.gov>

Directory: [/pub/data/cvb](ftp://ftp.ncdc.noaa.gov/pub/data/cvb)

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA  
Federal Building  
151 Patton Avenue, Room 120  
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

# UNITED STATES JUNE CLIMATE IN HISTORICAL PERSPECTIVE

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TABLE 1. PRECIPITATION AND TEMPERATURE RANKS, BASED  
ON THE PERIOD 1895-1996. 1 = DRIEST/COLDEST,  
102 = WARMEST FOR JUNE 1996 TEMPERATURES,  
102 = WETTEST/WARMEST FOR JAN-JUNE 1996,  
101 = WETTEST/WARMEST FOR JULY 1995-JUNE 1996.  
PRESENT MONTH PRECIPITATION EXPRESSED CATEGORICALLY:  
WET = WET 1/3 OF THE HISTORICAL DISTRIBUTION,  
MID = WITHIN THE MIDDLE 1/3 OF THE DISTRIBUTION,  
DRY = DRY 1/3 OF THE HISTORICAL DISTRIBUTION.

REGION	JUNE 1996	JAN-JUN 1996	JUL 1995- JUN 1996
-----	----	-----	-----
PRECIPITATION:			
NORTHEAST	WET	93	90
EAST NORTH CENTRAL	WET	64	81
CENTRAL	MID	78	49
SOUTHEAST	DRY	41	64
WEST NORTH CENTRAL	DRY	41	56
SOUTH	MID	2	4
SOUTHWEST	MID	11	2
NORTHWEST	DRY	94	96
WEST	DRY	71	44
NATIONAL	DRY	30	27
TEMPERATURE:			
NORTHEAST	83	33	30
EAST NORTH CENTRAL	64	15	12
CENTRAL	56	26	21
SOUTHEAST	41	19	15
WEST NORTH CENTRAL	81	30	35
SOUTH	75	65	65
SOUTHWEST	91	100	100
NORTHWEST	57	69	75
WEST	81	96	99
NATIONAL	80	54	63

TABLE 2.

STATISTICS FOR SELECTED RIVER BASINS:  
 AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR  
 EXTREME LONG-TERM (PALMER) DROUGHT, AND AREAL PERCENT  
 OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM  
 (PALMER) WET CONDITIONS, AS OF JUNE 1996.  
 RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER  
 RESOURCES COUNCIL.

RIVER BASIN -----	% AREA DRY -----	% AREA WET -----
MISSOURI BASIN	.0%	31.4%
PACIFIC NORTHWEST BASIN	.0%	58.9%
CALIFORNIA RIVER BASIN	28.8%	21.3%
GREAT BASIN	39.8%	18.2%
UPPER COLORADO BASIN	31.6%	.0%
LOWER COLORADO BASIN	100.0%	.0%
RIO GRANDE BASIN	76.2%	.0%
ARKANSAS-WHITE-RED BASIN	49.7%	.0%
TEXAS GULF COAST BASIN	90.7%	.0%
SOURIS-RED-RAINY BASIN	.0%	49.4%
UPPER MISSISSIPPI BASIN	.0%	16.7%
LOWER MISSISSIPPI BASIN	16.7%	.0%
GREAT LAKES BASIN	.0%	16.6%
OHIO RIVER BASIN	4.6%	24.8%
TENNESSEE RIVER BASIN	.0%	.0%
NEW ENGLAND BASIN	.0%	7.7%
MID-ATLANTIC BASIN	.0%	23.3%
SOUTH ATLANTIC-GULF BASIN	.0%	.0%

TABLE 3. EXTREMES, 1961-90 NORMALS, AND 1996 VALUES FOR JUNE. IT SHOULD BE NOTED THAT THE 1996 VALUES WILL CHANGE DUE TO THE USE OF A DENSER STATION NETWORK.

REGION	PRECIPITATION (INCHES)				1996
	DRIEST	WETTEST	NORMAL		
-----	VALUE	YEAR	VALUE	YEAR	PCPN
-----	-----	-----	-----	-----	-----
NORTHEAST	1.60	1988	8.53	1972	3.84
EAST NORTH CENTRAL	1.41	1910	6.68	1967	3.89
CENTRAL	1.03	1988	9.10	1928	3.95
SOUTHEAST	2.20	1931	8.37	1900	4.86
WEST NORTH CENTRAL	1.25	1933	5.27	1947	2.73
SOUTH	.98	1933	6.85	1989	3.66
SOUTHWEST	.16	1916	1.93	1927	.93
NORTHWEST	.32	1919	3.02	1947	1.48
WEST	.01	1935	1.14	1963	.46
NATIONAL	1.43	1933	4.19	1928	2.84

\* PRELIMINARY VALUE, CONFIDENCE  
INTERVAL + OR - .25 INCHES

REGION	TEMPERATURE (DEGREES F)				1996
	COLDEST	WARMEST	NORMAL		
-----	VALUE	YEAR	VALUE	YEAR	TEMP
-----	-----	-----	-----	-----	-----
NORTHEAST	60.3	1958	68.6	1943	64.4
EAST NORTH CENTRAL	59.5	1969	72.4	1933	65.3
CENTRAL	66.2	1903	77.6	1952	71.3
SOUTHEAST	73.0	1955	80.8	1952	75.8
WEST NORTH CENTRAL	56.7	1951	71.6	1988	63.2
SOUTH	72.1	1903	83.8	1953	77.6
SOUTHWEST	63.4	1907	72.8	1994	68.1
NORTHWEST	54.9	1953	64.8	1918	59.9
WEST	62.2	1944	74.0	1918	67.7
NATIONAL	66.2	1907	72.0	1933	69.0

\* PRELIMINARY VALUE, CONFIDENCE  
INTERVAL + OR - .2 DEG. F.

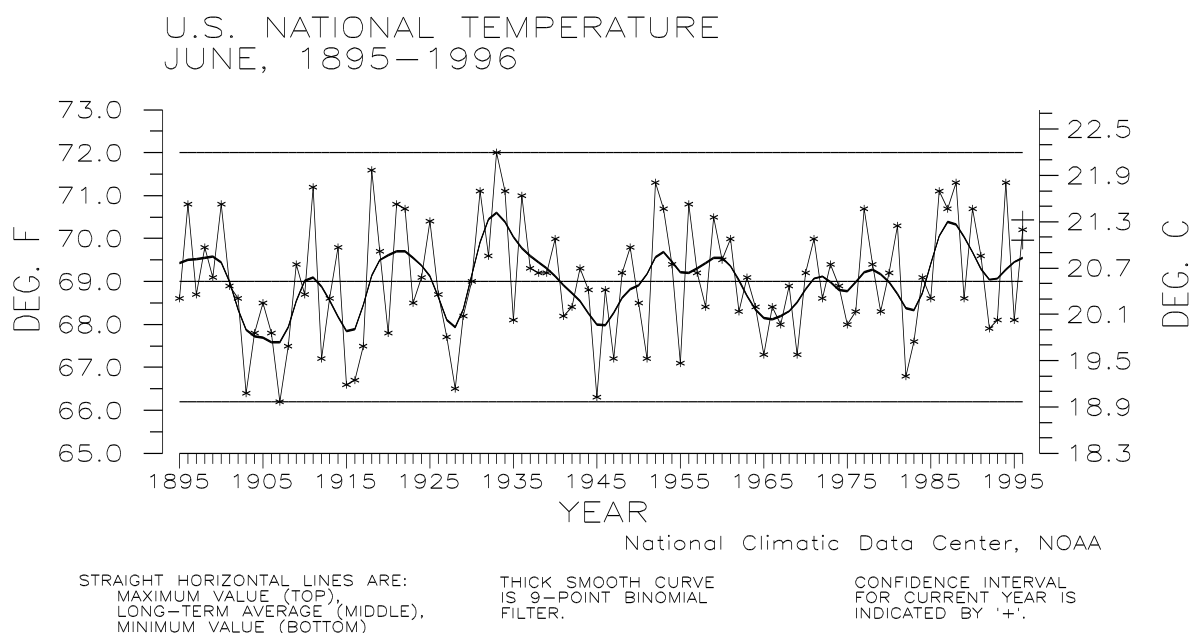


Figure 1: Preliminary data for June 1996 indicate that temperature averaged across the contiguous United States was above the long-term mean ranking as the 23rd warmest June since 1895. Ten percent of the country averaged much warmer than normal while none of the country averaged much cooler than normal.

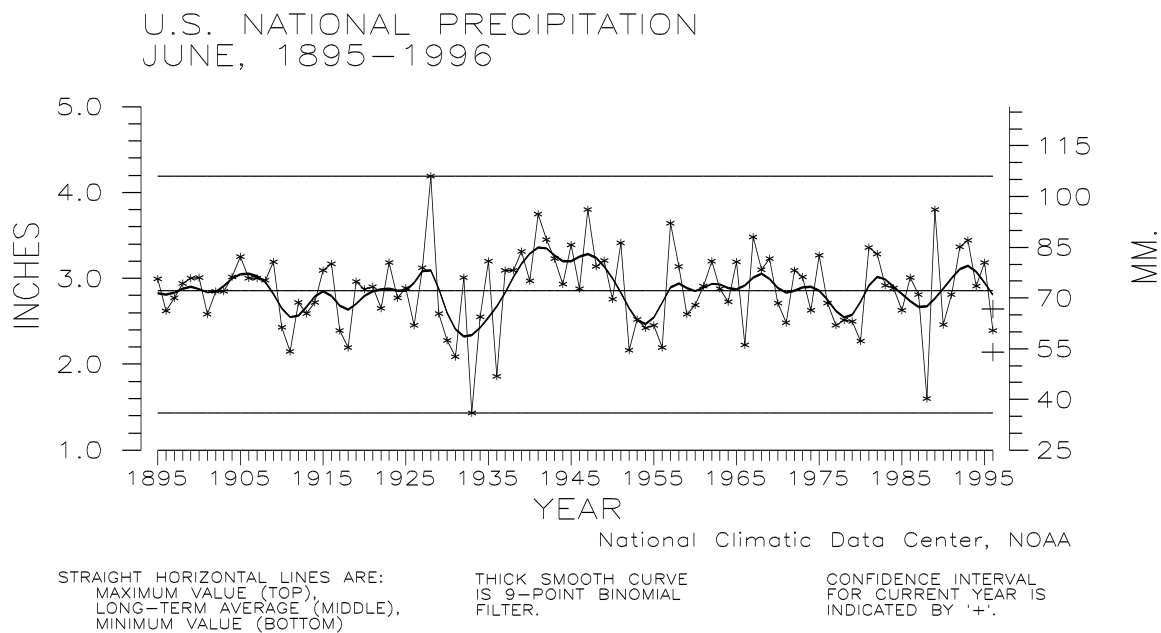


Figure 2: June 1996 was the 12th driest such month since 1895. About a quarter of the country experienced much drier than normal conditions while about five percent was much wetter than normal.

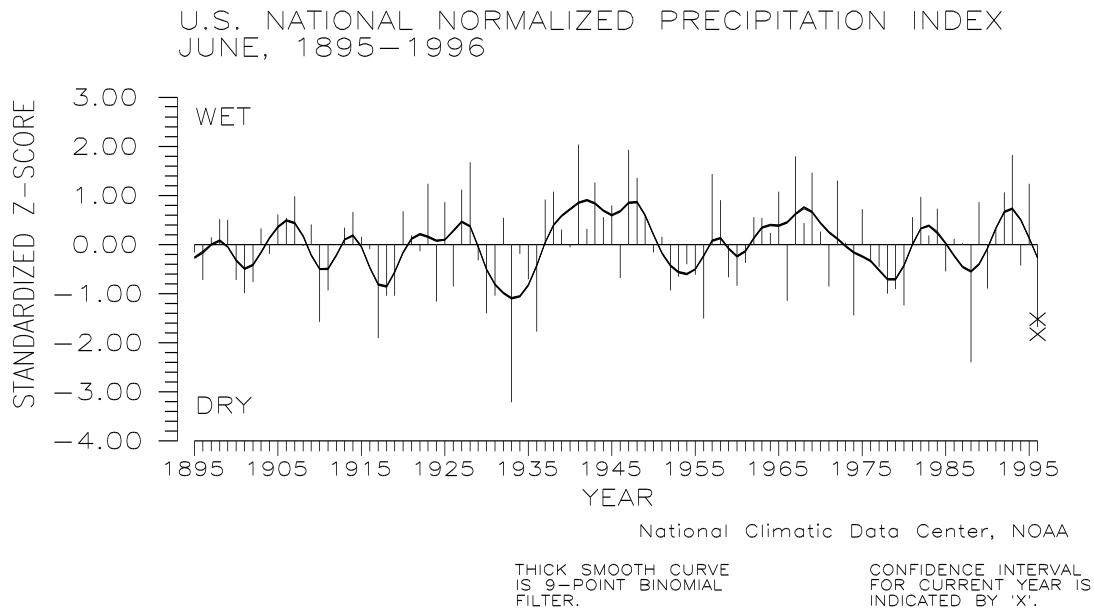


Figure 3: The preliminary national standardized precipitation index ranked June 1996 as the fifth driest such month on record. This standardized z-score is estimated to be accurate to within 0.149 index units and its confidence interval is shown as an 'X'.

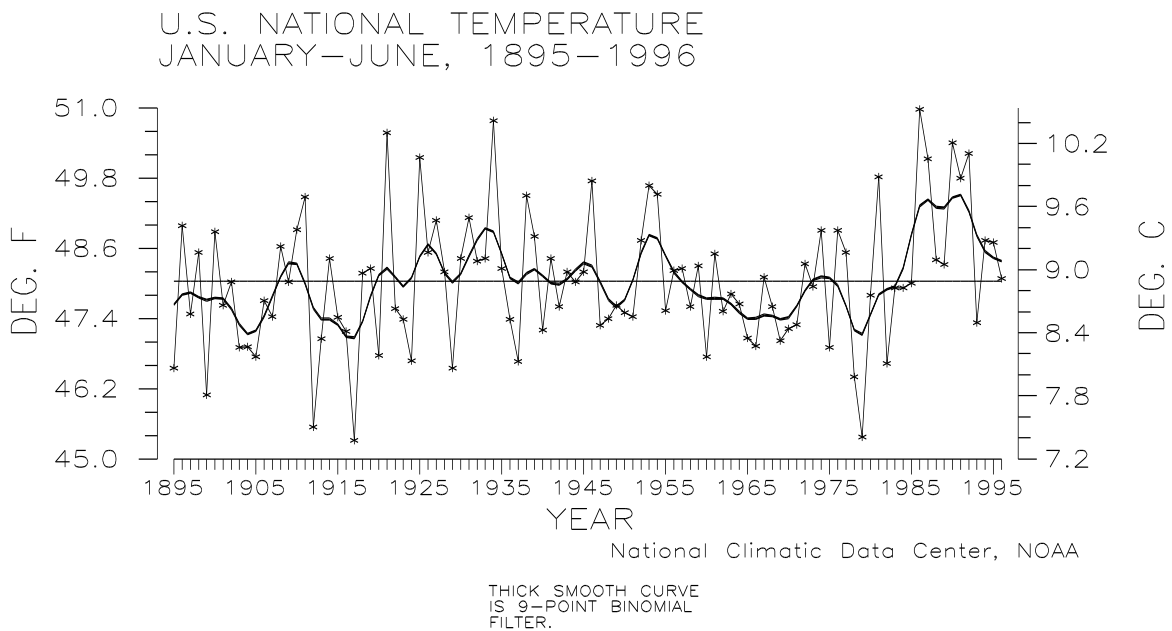


Figure 4: National averaged temperature for the six-month period was at the long-term mean ranking as the 49th warmest January–June since 1895.

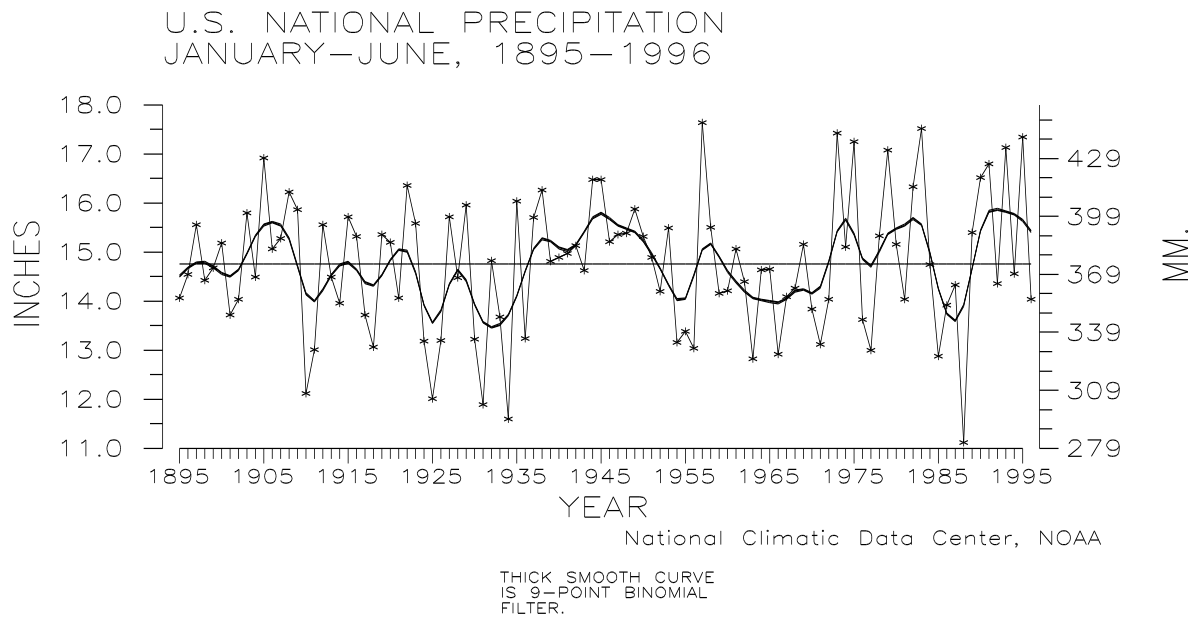


Figure 5: Preliminary data for national January through June precipitation indicate that year-to-date precipitation was slightly below the long-term mean ranking as the 30th driest such period on record.

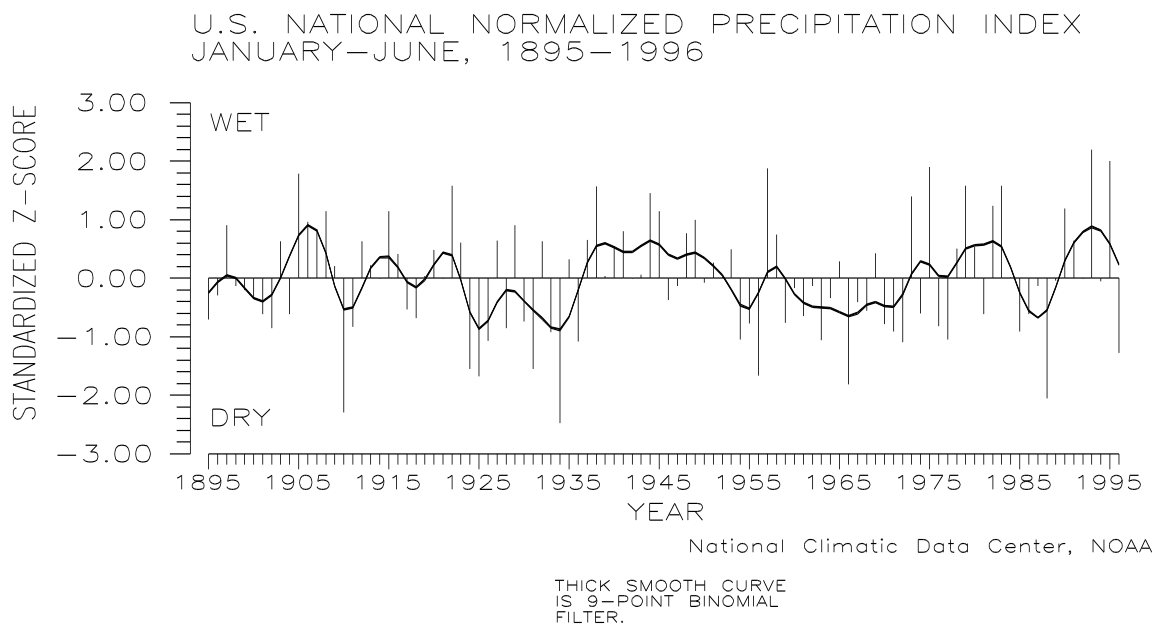


Figure 6: The preliminary national standardized precipitation index ranked January-June 1996 as the ninth driest such six-month period on record.

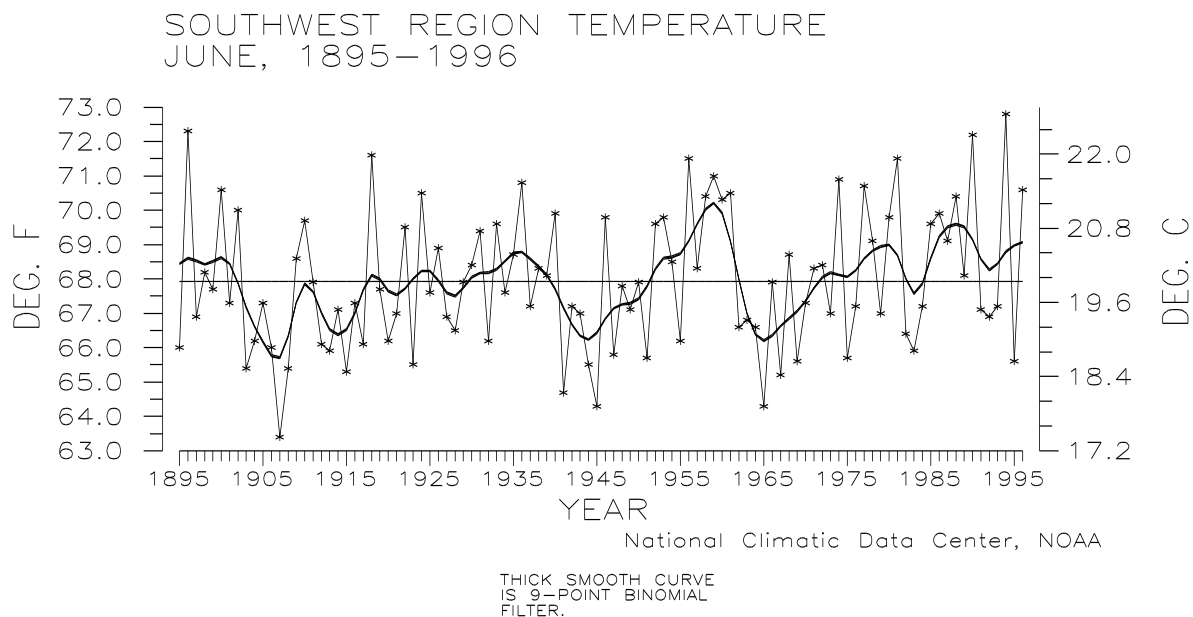


Figure 7: June 1996 was the 12th warmest such month since 1895 for the Southwest region. For the year-to-date, the Southwest region has had the third warmest such period on record (see Table 1). The twelve-month period, July 1995-June 1996, is the second warmest such period on record (Table 1).

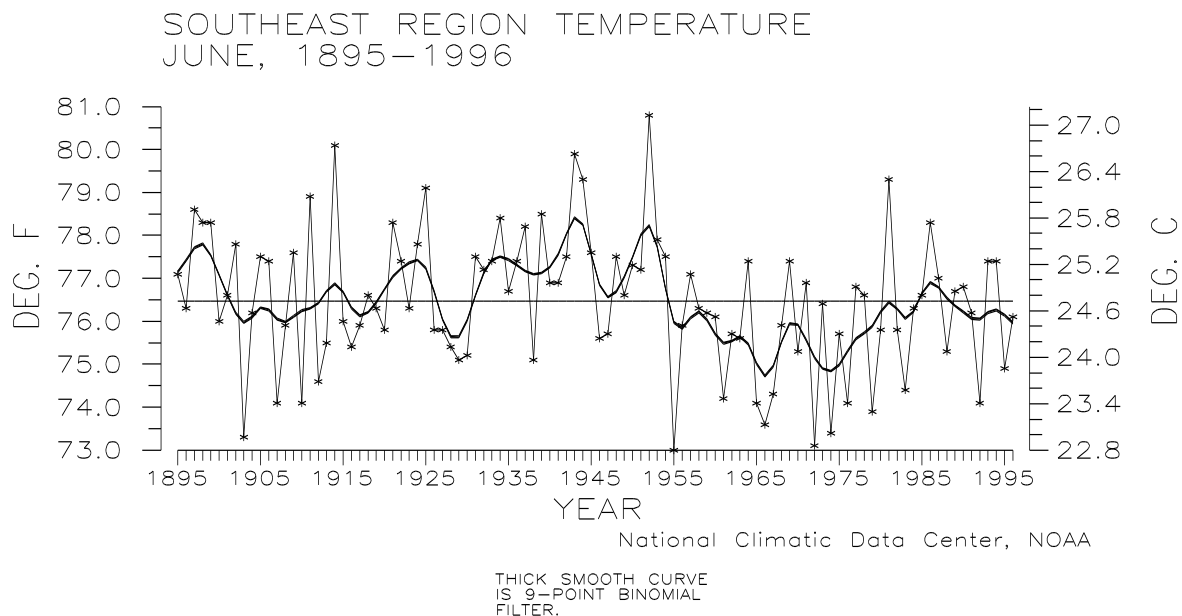
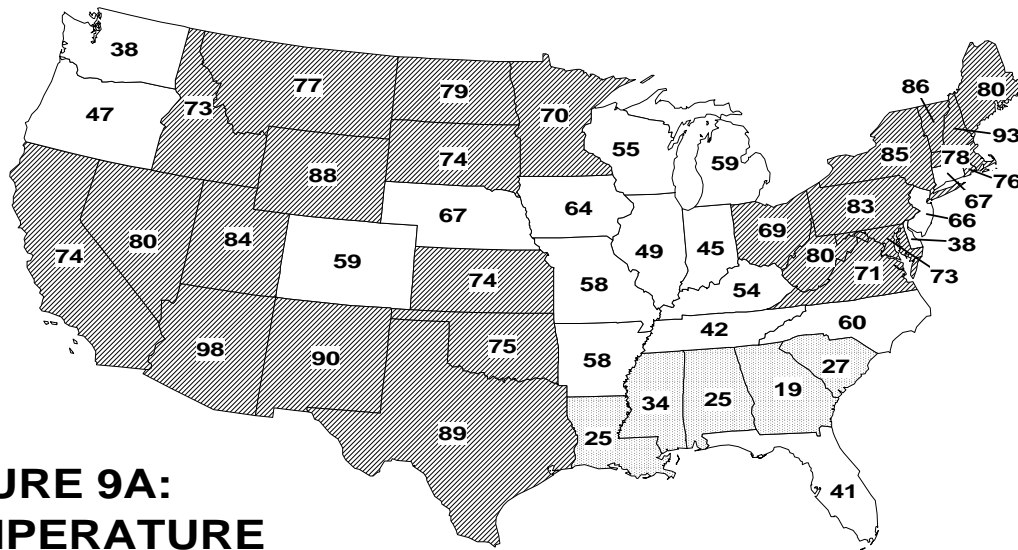


Figure 8: June 1996 was the 41st coolest such month since 1895 for the Southeast region of the United States. The January through June period was the 19th coolest such period on record, and July 1995-June 1996 ranked 15th coolest (see Table 1).

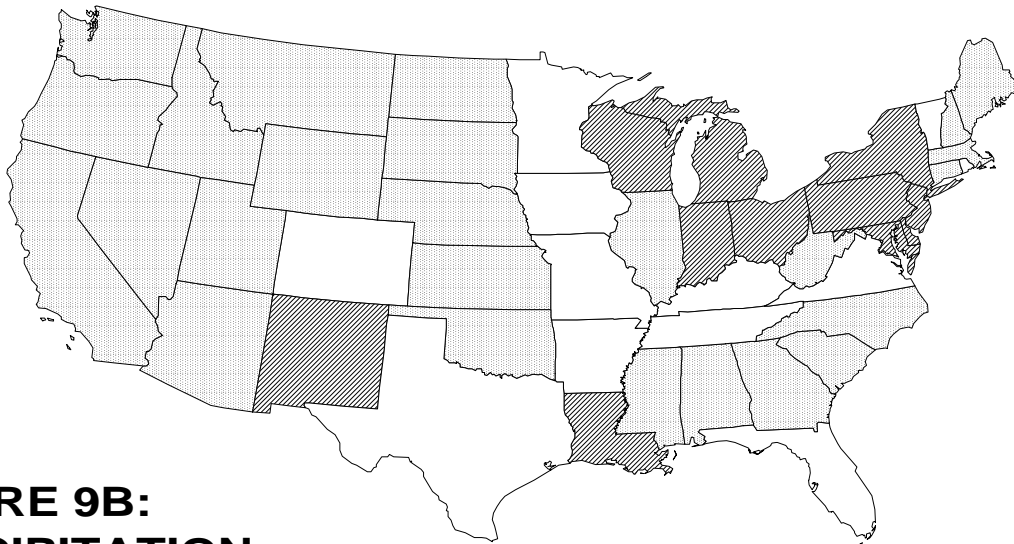
# JUNE 1996 STATEWIDE RANKS



**FIGURE 9A:  
TEMPERATURE**

1 = Coldest  
102 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.



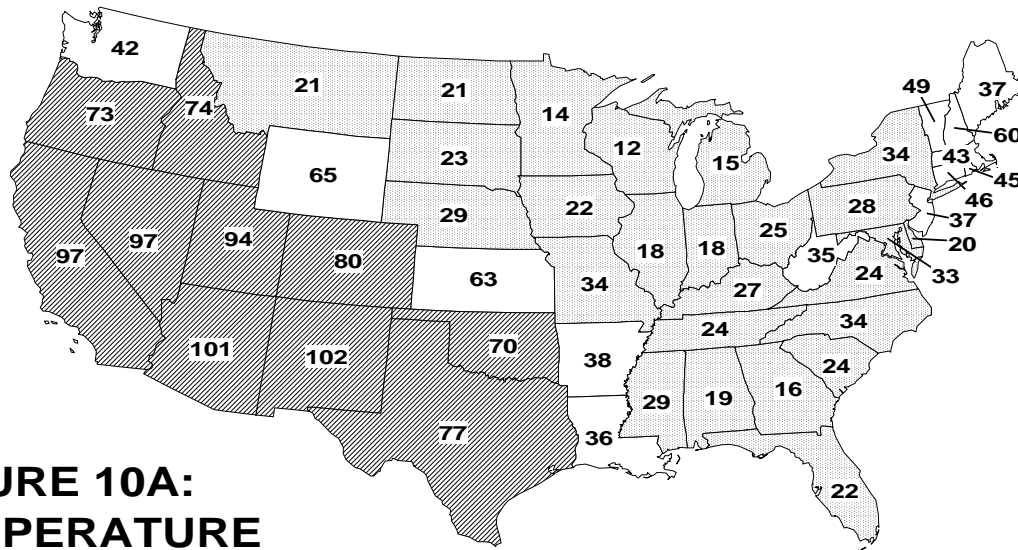
**FIGURE 9B:  
PRECIPITATION**

National Climatic Data Center, NOAA

Wet Third  
Middle Third  
Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

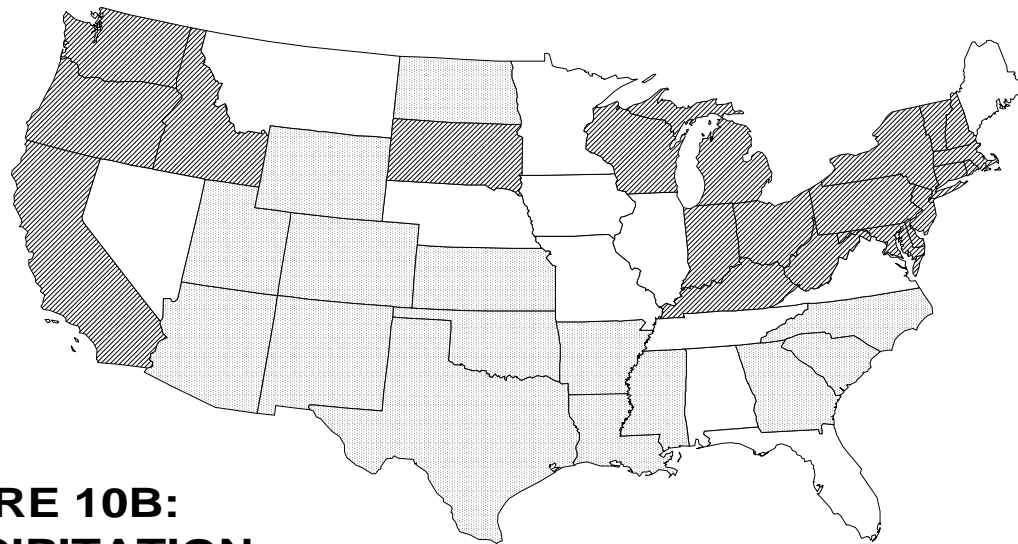
# JANUARY-JUNE, 1996 STATEWIDE RANKS



**FIGURE 10A:  
TEMPERATURE**

1 = Coldest  
102 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.



**FIGURE 10B:  
PRECIPITATION**

National Climatic Data Center, NOAA

Wet Third  
Middle Third  
Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

Figure 9A shows, in illustrative map form, the June 1996 temperature rankings for the 48 contiguous states. Two states, Arizona and New Hampshire, were within the top ten warmest while an additional twenty-three ranked within the warm third. No states ranked within the top ten cool portion of the historical distribution for June, however five (all located in the southeastern portion of the country) ranked within the cool third of the distribution.

June 1996 state categorical ranks for precipitation are shown in Figure 9B. Twenty-five states ranked within the dry third of the historical distribution while 11 states ranked within the wet third. The early season monsoonal rains in New Mexico were accompanied by reports of localized flooding. ***It should be noted that these June state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.***

Figure 10A shows the year-to-date temperature rankings for the 48 contiguous states. The 1996 year-to-date is the warmest such period on record for New Mexico and the second warmest for Arizona. January-June 1996 is the sixth warmest such period on record for California and Nevada and the ninth warmest such period for Utah. Five other states ranked within the warm third of the distribution.

January through June state categorical ranks for precipitation are shown in Figure 10B. Fifteen states ranked within the dry third of the distribution while twenty-one states ranked within the wet third of the distribution.

Figure 16A shows the nine-month (October 1995-June 1996) temperature ranking for the contiguous United States. The nine-month period is the warmest such period on record for both Arizona and California, second warmest such period for New Mexico, third warmest for Nevada, and fourth warmest such period for Utah. Six other states, all located in the western third of the country, ranked within the warm third of the distribution. Five states also ranked within the top ten coolest for the nine-month period. It was the seventh coolest such period for Alabama, eighth coolest for Michigan and Minnesota, ninth coolest for Wisconsin, and the tenth coolest nine-month period for Indiana. Twenty-three other states ranked within the cool third of the distribution for the nine-month period.

October 1995 through June 1996 state categorical ranks for precipitation are shown in Figure 16B. Fourteen states ranked within the dry third of the historical distribution while twenty-three states ranked within the wet third of the distribution.

***It should be emphasized that all of the temperature and precipitation ranks on these maps and in Table 1 are based on preliminary data. The ranks will change when the final data are processed.***

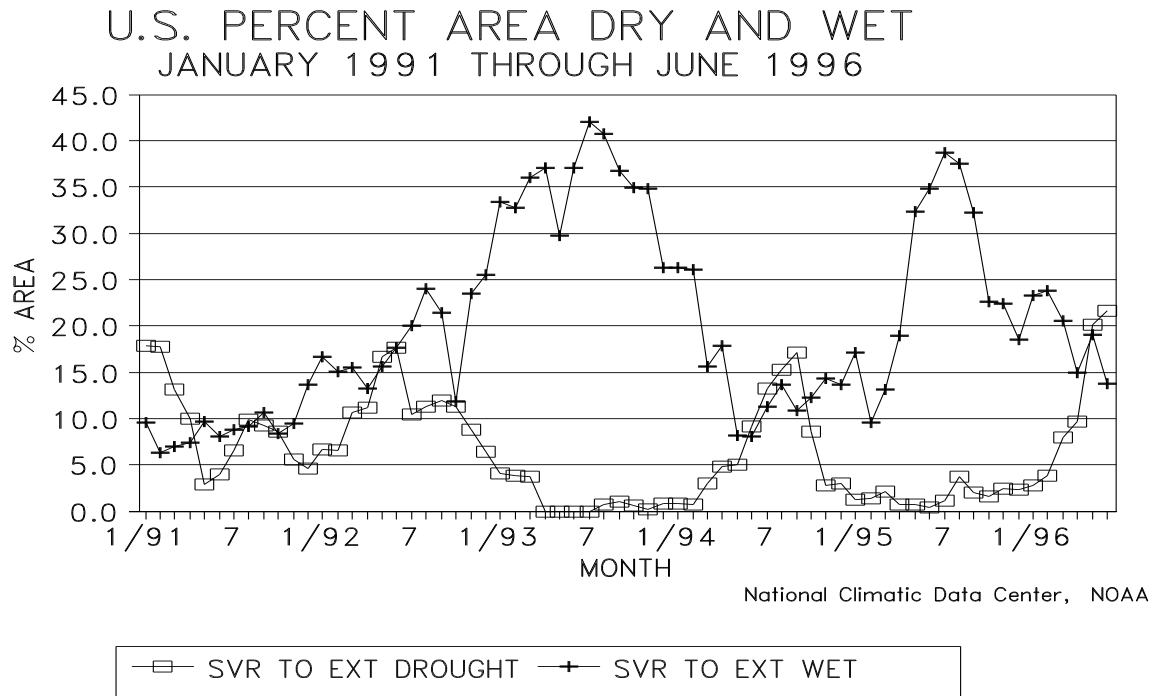


Figure 11: Long-term drought coverage (as measured by the Palmer Drought Index) during June increased while the percent area of the country experiencing severe to extreme wetness decreased. About 21% of the country experienced very dry conditions while about 15% was much wetter than normal by the end of June 1996.

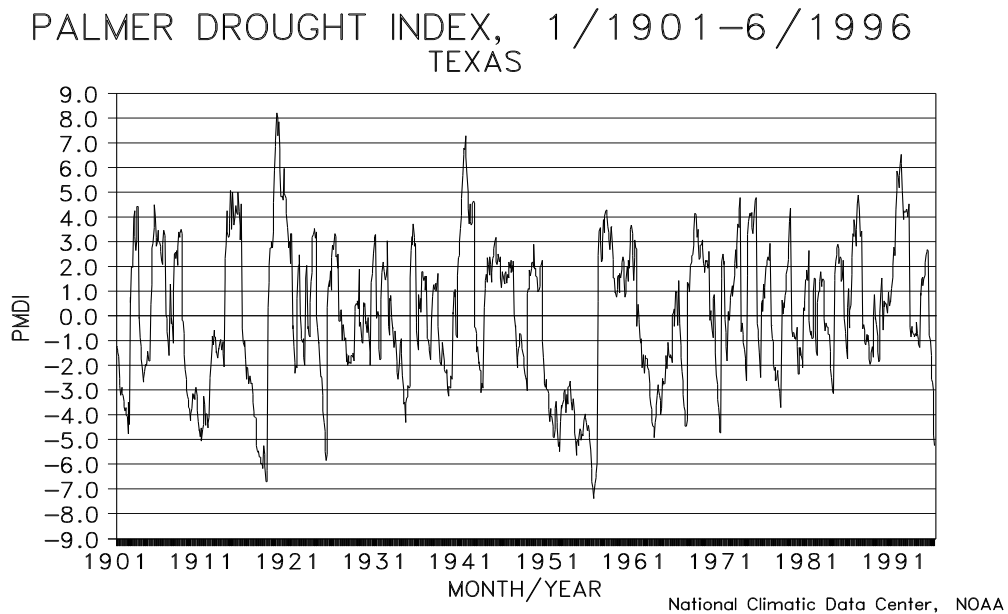


Figure 12: The rapid onset of drought conditions in Texas parallel those seen in the 1950's and 1960's.

## % OF NORMAL MONTHLY PRECIPITATION JANUARY 1995–JUNE 1996

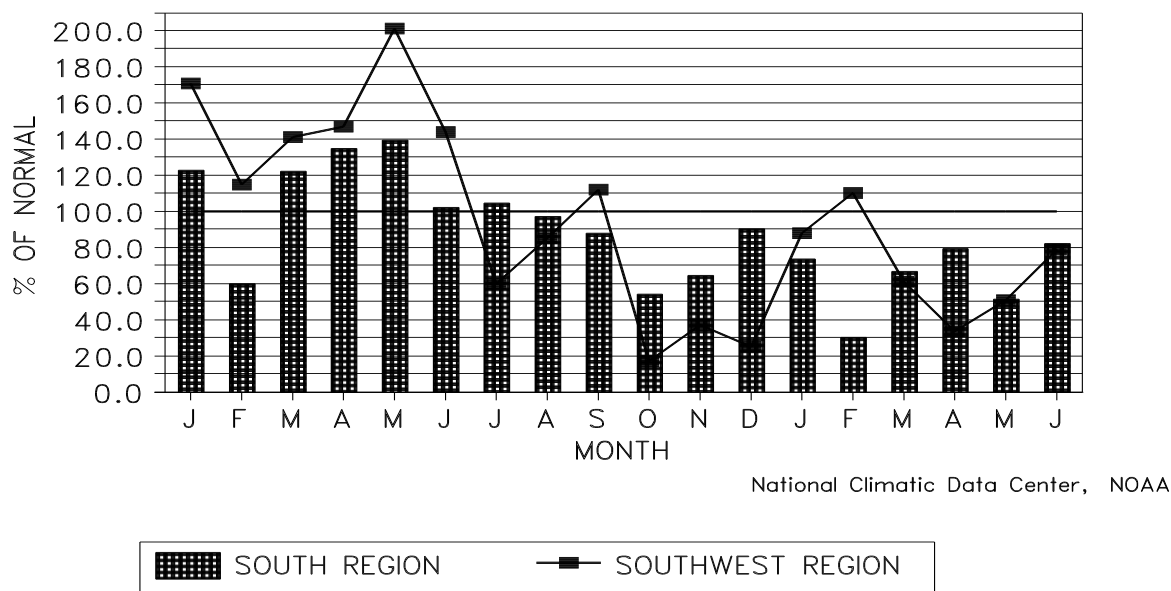


Figure 13: The South region has received less than normal monthly precipitation amounts every month since August 1995 while the Southwest region has been running monthly deficits consistently (except for February 1996) since October 1995.

## SOUTHWEST REGION PRECIPITATION OCTOBER–JUNE, 1895–96/1995–96

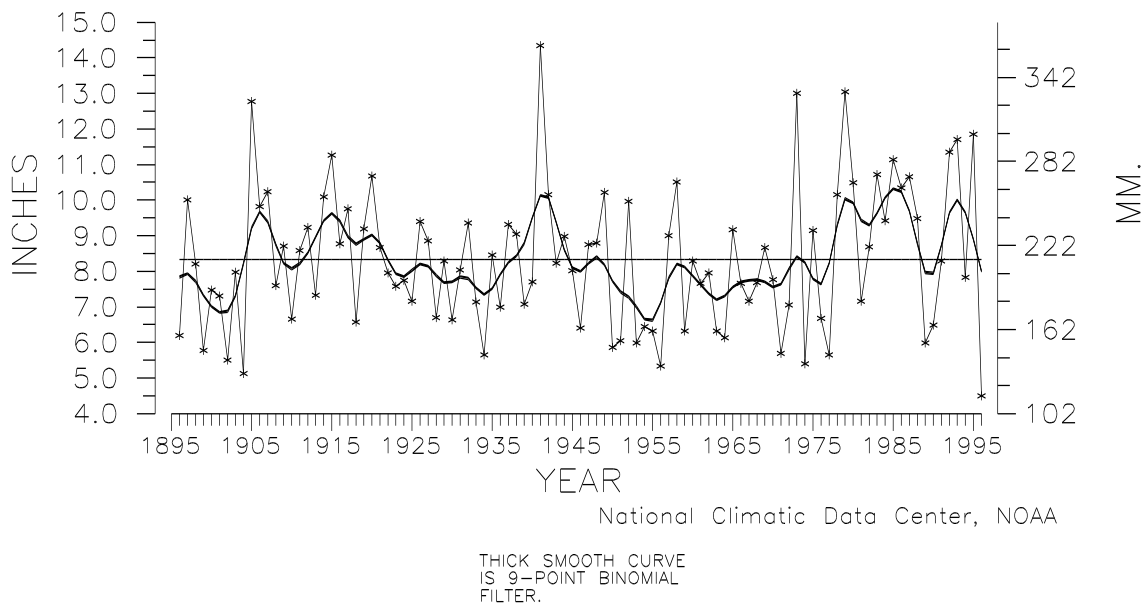
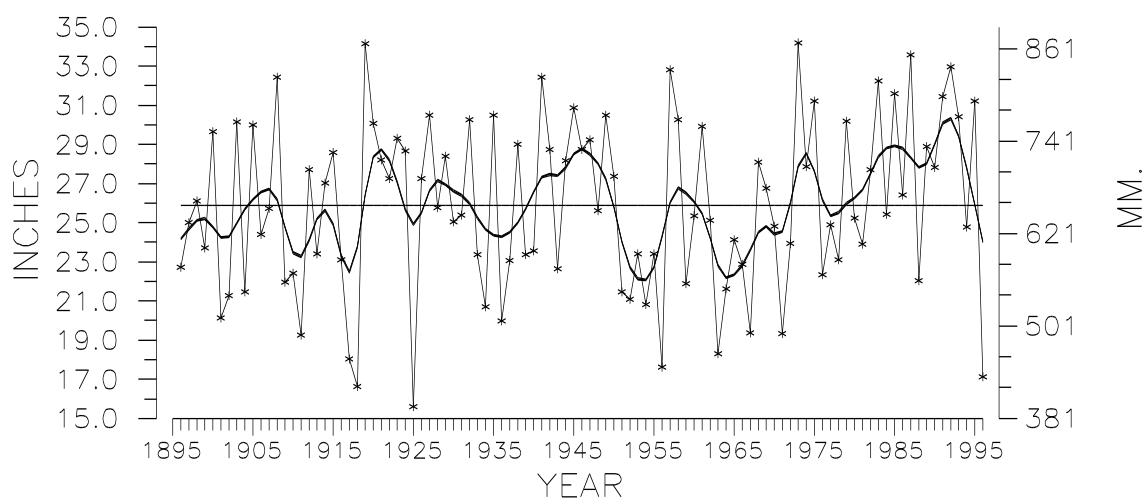


Figure 14: After a string of near to much wetter than normal October-June periods, October 1995 through June 1996 was a major shift in the pattern, ranking as the driest such period on record for the Southwest Region.

# SOUTH REGION PRECIPITATION OCTOBER-JUNE, 1895-96/1995-96

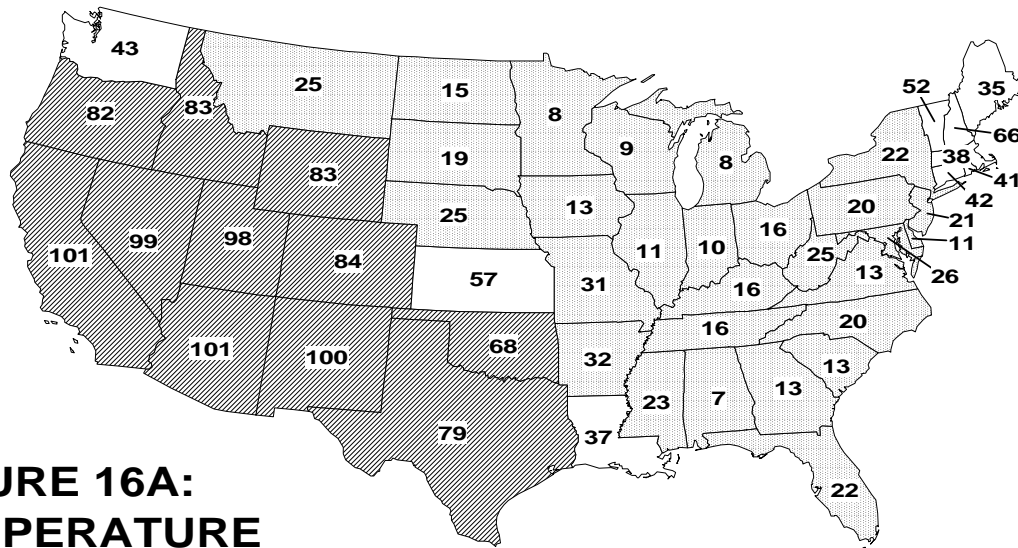


National Climatic Data Center, NOAA

THICK SMOOTH CURVE  
IS 9-POINT BINOMIAL  
FILTER.

Figure 15: The October 1995-June 1996 period in the South Region is comparable to similar such periods of the late teens, mid-1920's, and early to mid-1950's, in terms of dryness.

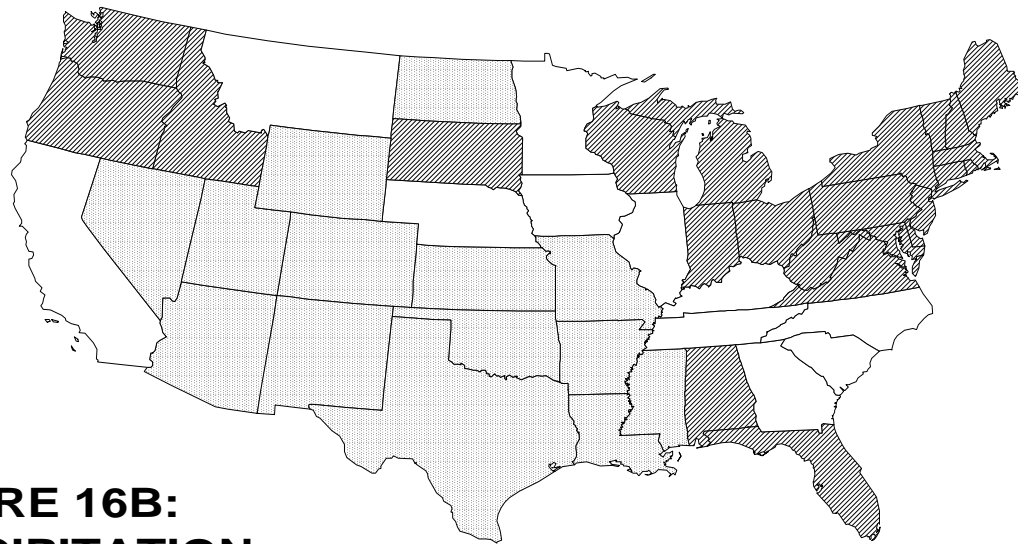
# OCTOBER 1995-JUNE 1996 STATEWIDE RANKS



**FIGURE 16A:  
TEMPERATURE**

1 = Coldest  
101 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.



**FIGURE 16B:  
PRECIPITATION**

Wet Third  
Middle Third  
Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

National Climatic Data Center, NOAA

# **PALMER DROUGHT INDEX** **Long-Term Conditions** **as of June 1996**

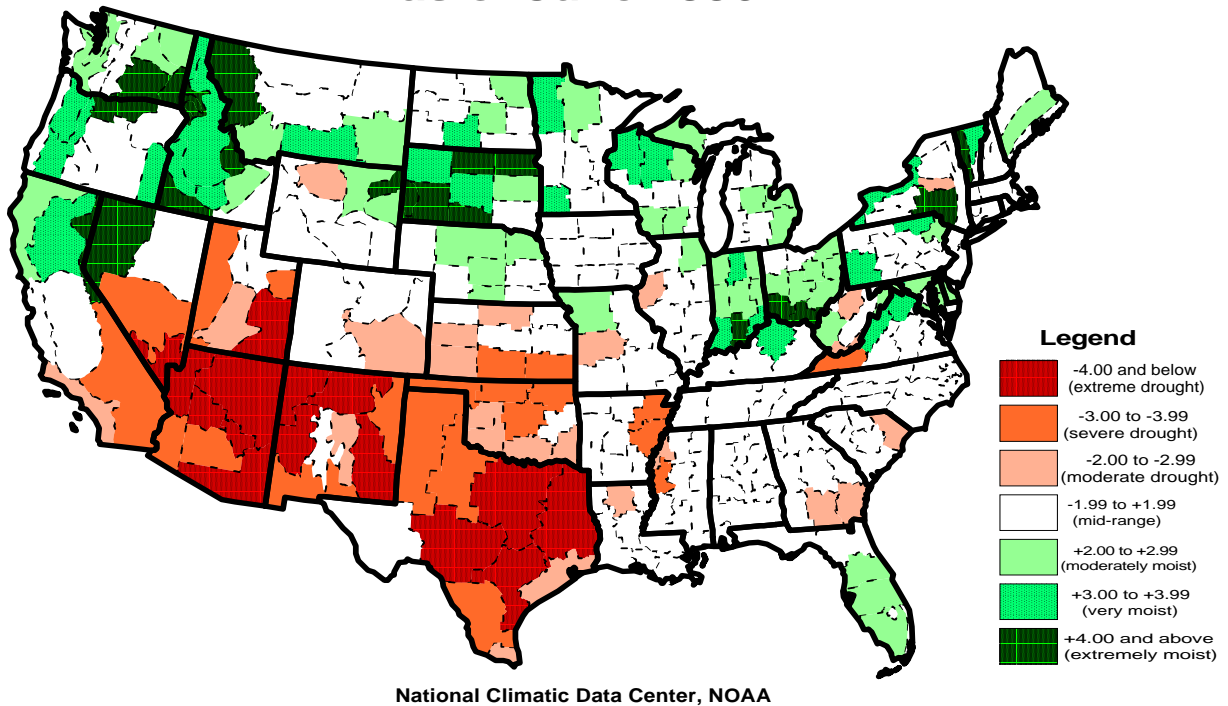
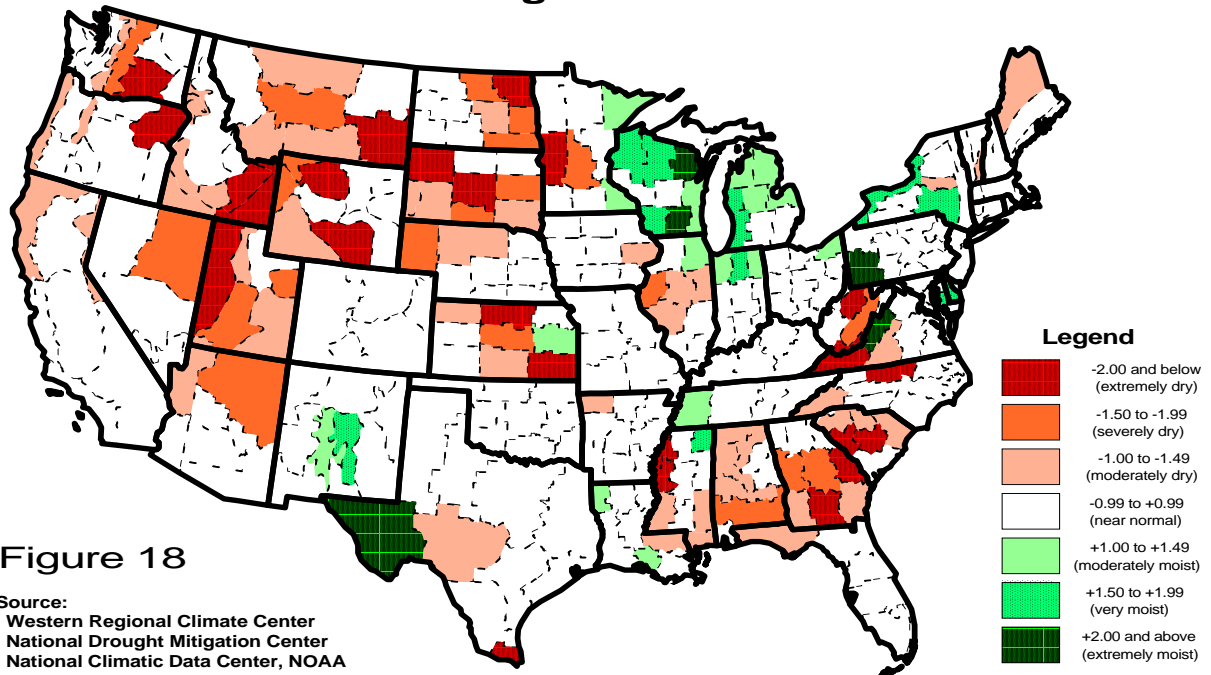


Figure 17: The Palmer Drought Index (PDI) is a measure of how the long-term, or cumulative, water supply (mainly precipitation) in an area compares to its water demand (mainly evapotranspiration). This water balance model was developed by Wayne Palmer in the 1960's and has become widely used in the United States. PDI values less than zero indicate water demand is greater than supply, with values less than -3.00 indicating severe to extreme drought (shaded red above). Positive values indicate water supply is greater than demand, with values greater than +3.00 indicating severe to extreme wet spell (shaded green above).

The PDI map for June 1996 shows a large area of severe to extreme drought stretching from the Desert Southwest and the intermountain basin to the southern Plains. Severely to extremely wet conditions exist from the Pacific Northwest and northern California to the northern Plains, and across parts of the Ohio Valley to the Northeast.

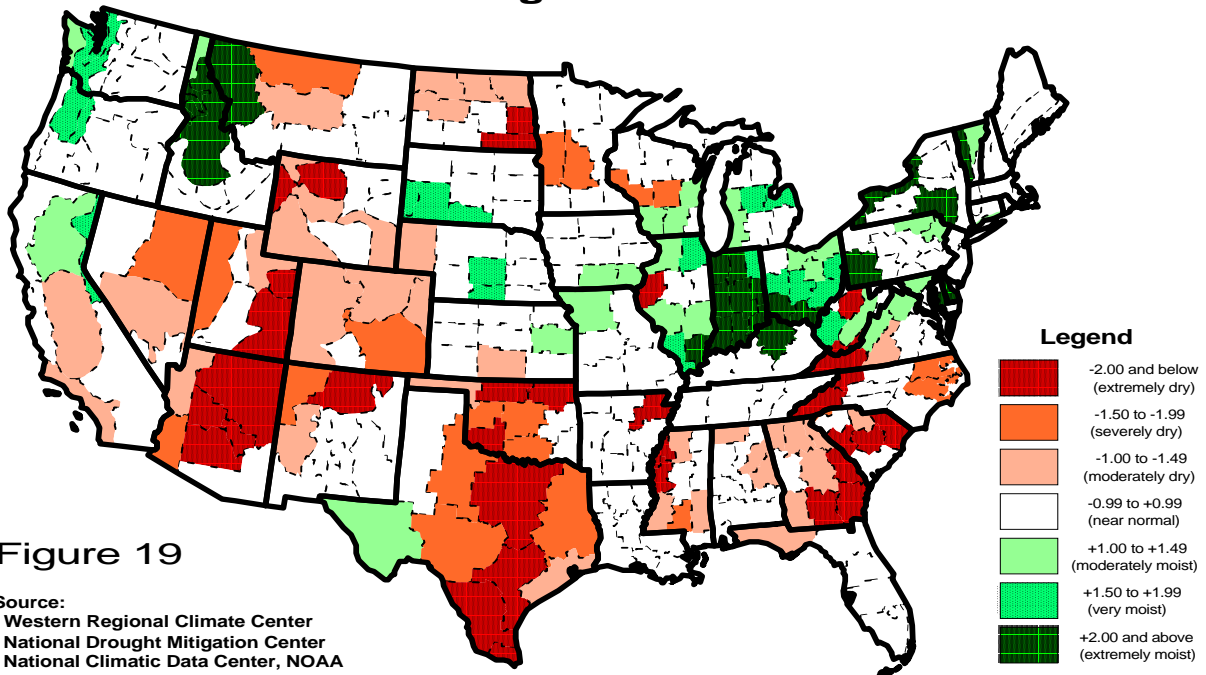
**STANDARDIZED PRECIPITATION INDEX  
(By Climatic Division)  
1-Month SPI through the end of June 1996**



**Figure 18**

Source:  
Western Regional Climate Center  
National Drought Mitigation Center  
National Climatic Data Center, NOAA

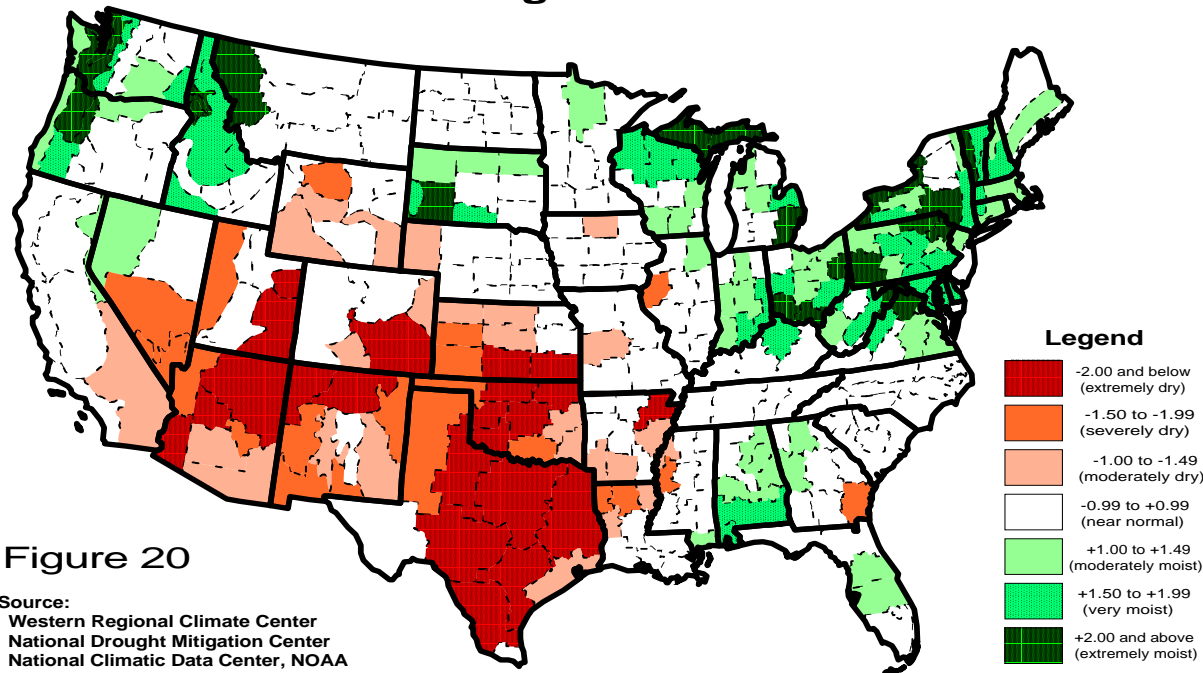
**STANDARDIZED PRECIPITATION INDEX  
(By Climatic Division)  
3-Month SPI through the end of June 1996**



**Figure 19**

Source:  
Western Regional Climate Center  
National Drought Mitigation Center  
National Climatic Data Center, NOAA

## STANDARDIZED PRECIPITATION INDEX (By Climatic Division) 9-Month SPI through the end of June 1996



The SPI is a standardized precipitation index which is computed over several monthly intervals. Standardized precipitation is the difference of precipitation from the mean for a specified time period divided by the standard deviation, where the mean and standard deviation are determined from past records. The SPI, as developed by Colorado State University scientists led by Dr. Tom McKee, uses a statistical transformation of the historical data to compensate for the data's skewed distribution. The resulting computation of standardized precipitation is linearly proportional to precipitation deficit and allows consistent comparison of moisture anomalies from one region to another. SPI values less than zero indicate drought, while positive values represent wet spells.

Maps of SPI for three averaging periods are shown in Figures 18-20. The map for June 1996 (Figure 18) shows dry anomalies (red shading) clustered in the Southeast and middle Appalachians, and spreading from the northern and central Plains westward. Parts of Texas and the Desert Southwest were also unusually dry during June. Unusually wet conditions (green shading) occurred in the Great Lakes region and in other parts of Texas and the Desert Southwest, providing some relief from drought in the latter region.

However, long-term conditions in the southern Plains and Desert Southwest remained unusually dry. Precipitation deficits in the severely to extremely dry categories covered much of the region for the 3-month April-June period (Figure 19) and most of the region for the 9-month October 1995-June 1996 period (Figure 20).

Severe to extreme drought developed over the last three months in the Southeast (Figure 19). Areas from the Ohio Valley to the Northeast have experienced a long-term wet spell over the 3-month and 9-month time scales (Figures 19 and 20).

The long-term (i.e., 9-month) SPI anomaly pattern (Figure 20) is similar to the Palmer Drought Index pattern (Figure 17). They are similar because, while the computational methods differ, both indices measure moisture anomalies integrated over a long time period.